

REMARKS

Claims 12-20, 22-26, and 29 are pending and under rejection, claims 1-11, 21, and 27-28 having been canceled in prior amendments. Claims 12 and 22 are amended here to recite that the filter device comprises fibers in a amount of up to 20% by weight. Claim 22 also has been amended to recited that the firing temperature is up to 2000 °C. Support for these amendments appears at page 12, lines 1-9 and in claim 11 of the specification as filed. No new matter has been added to the application.

Claim Rejections - 35 U.S.C. § 112

Claim 29 stands rejected under the second paragraph of 35 U.S.C. § 112. It is alleged that the firing temperature range is unclear because the claim recites a range of 500 °C to 2000 °C, whereas the firing temperature in claim 22, from which claim 29 depends, is up to 1000 °C. As amended, claim 22 now recites a firing temperature of up to 2000 °C, consistent with claim 29. The rejection of claim 29 as indefinite should not be maintained in the next action.

Claim Rejections - 35 U.S.C. § 103

Claims 12-20 are directed to filter devices and stand rejected for obviousness over U.S. Patent No. 5,690,161 (Daussan) in view of U.S. Patent No. 5,785,851 (Morris) and U.S. Publication No. 2007/0090047 (Bell). Claims 22-26 and 29 are directed to methods of making filter devices and stand rejected as obvious over Bell in view of Daussan and Morris. For the reasons that follow, applicant respectfully urges that these references as combined do not render the claims as amended *prima facie* obvious, and these rejections should not be maintained.

The claims as amended specify that the filter devices of the claimed apparatus and methods are comprised of up to 20% by weight of ceramic fibers. As explained in the present application,

Adding up to 20% by weight of fibers to the filter recipes contribute to a significant improvement in the performance of the filters. The improvement is mainly due to increase mechanical strength, improve stiffness, higher impact resistance and better thermal shock. The improvement is manifested it self by increase filtration capacity, better mechanical integrity and less contamination to the steel casting. Also because of the increase in mechanical strength due to the

use of fibers, the whole weight of the filter can be reduced resulting in reducing costs and improved efficiency of the filter.

Specification as filed at page 12, lines 1-9.

None of the references describes the filter as claimed, wherein the ceramic fibers form part of the carbon bonded network in an amount up to 20% by weight. Morris does not mention fibers at all. Daussan discloses filling voids between two refractory filter plates with refractory fibers. The fibers do not form part of a carbon bonded network in the filter and therefore do not describe or suggest the claimed filters or the benefits they provide, i.e. increased mechanical strength, improved stiffness, higher impact resistance, better thermal shock resistance, increased filtration capacity, lower casting contamination, and improved filtration efficiency.

Bell at paragraphs [0036-37] does describe the inclusion of refractory particulate material in the carbon-bonded filters, and that such refractory particles may take the form of "fibrous materials." However, Bell specifies that the refractory particulate material comprises at least 50% by weight of the filter. Bell has absolutely no disclosure of how much refractory particulate material should be ceramic, nor how much ceramic material should be fibrous. Thus in order to reach the claims from Bell, one of skill would have to: a) select fibrous materials from all of the particulate forms disclosed; b) select ceramic materials from all of the refractory materials disclosed; and c) limit the content of ceramic fibrous materials to up to 20% by weight of the filter. Bell contains no disclosure, explicit or implicit, that would have led one of skill to make these multiple modifications to its disclosure to arrive at what applicants are claiming.

To impose the limits of the present claims on the disclosure of Bell would require one of skill first to determine that no more than two-fifths of the at least 50% by weight of the filter that Bell teaches must be comprised of refractory particulate material should be comprised of fibrous refractory material. Nothing in the description, examples, or claims of Bell describes or suggests this selection of fibrous material, nor the amount specified by applicant's claims. One of skill would then have to select ceramic fibrous materials from the many available refractory materials. Again, Bell provides the skill artisan no guidance as between the various refractory materials known to the art. Bell provides no teaching, as does the present application, that by adding ceramic fibers the

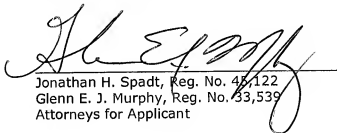
amount of carbon binder material may be dramatically reduced without compromising the integrity and performance of the resulting filters.

Any allegation that the present claims would have been *prima facie* obvious over the combined disclosures of Bell, Daussan, and Morris is nevertheless overcome by the evidence set forth in the example of the present invention. In Example 1, a filter suitable for filtering molten steel was prepared with only about 6% by weight of carbon binder material with about 5% by weight of ceramic fibers. The inclusion of the fibers permitted the use of far less carbon binder material than described in the prior art. For example, according to Bell no less than 25% binder material is used. The prior art provides no teaching that the inclusion of modest amounts of ceramic fibers up to 20% by weight would yield a filter with acceptable mechanical properties using so little carbon binder. This unexpected improvement over the prior art rebuts any allegation that the references of record would have made the present claims obvious.

Conclusion

For all of the foregoing reasons, applicant respectfully requests reconsideration and allowance of the claims. Applicant invites the examiner to contact their undersigned representative if it appears that this may expedite examination.

Respectfully submitted,



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Dated: June 22, 2010

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